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National Eutrophication Survey, Las Vegas, Nev

Prepared for

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NATIONAL EUTROPHICATION SURVEY

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REPORT

ON

PALISADES RESERVOIR

BONNEVILLE COUNTY, IDAHO

AND LINCOLN COUNTY, WYOMING

EPA REGION X

WORKING PAPER No. 786

WITH THE COOPERATION OF THE

IDAHO DEPARTMENT OF HEALTH AND WELFARE

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16. ABSTRACT
Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

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REPORT ON PALISADES RESERVOIR

BONNEVILLE COUNTY, IDAHO

AND LINCOLN COUNTY, WYOMING

EPA REGION X

by

National Eutrophication Survey

Water and Land Quality Branch
Monitoring Operations Division
Environmental Monitoring & Support Laboratory
Las Vegas, Nevada

and

Special Studies Branch
Corvallis Environmental Research Laboratory
Corvallis, Oregon

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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to freshwater lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point source discharge reduction and nonpoint source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's freshwater lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by the U.S. Environmental Protection Agency and to augment plans implementation by the states.

ACKNOWLEDGMENTS

The staff of the National Eutrophication Survey (Office of Research and Development, U.S. Environmental Protection Agency) expresses sincere appreciation to the Idaho Department of Health and Welfare for professional involvement, to the Idaho National Guard for conducting the tributary sampling phase of the Survey, and to those Idaho wastewater treatment plant operators who provided effluent samples and flow data.

The staff of the State of Idaho Department of Health and Welfare, Division of Environment, provided invaluable lake documentation and counsel during the Survey, reviewed the preliminary reports and provided critiques most useful in the preparation of this Working Paper Series.

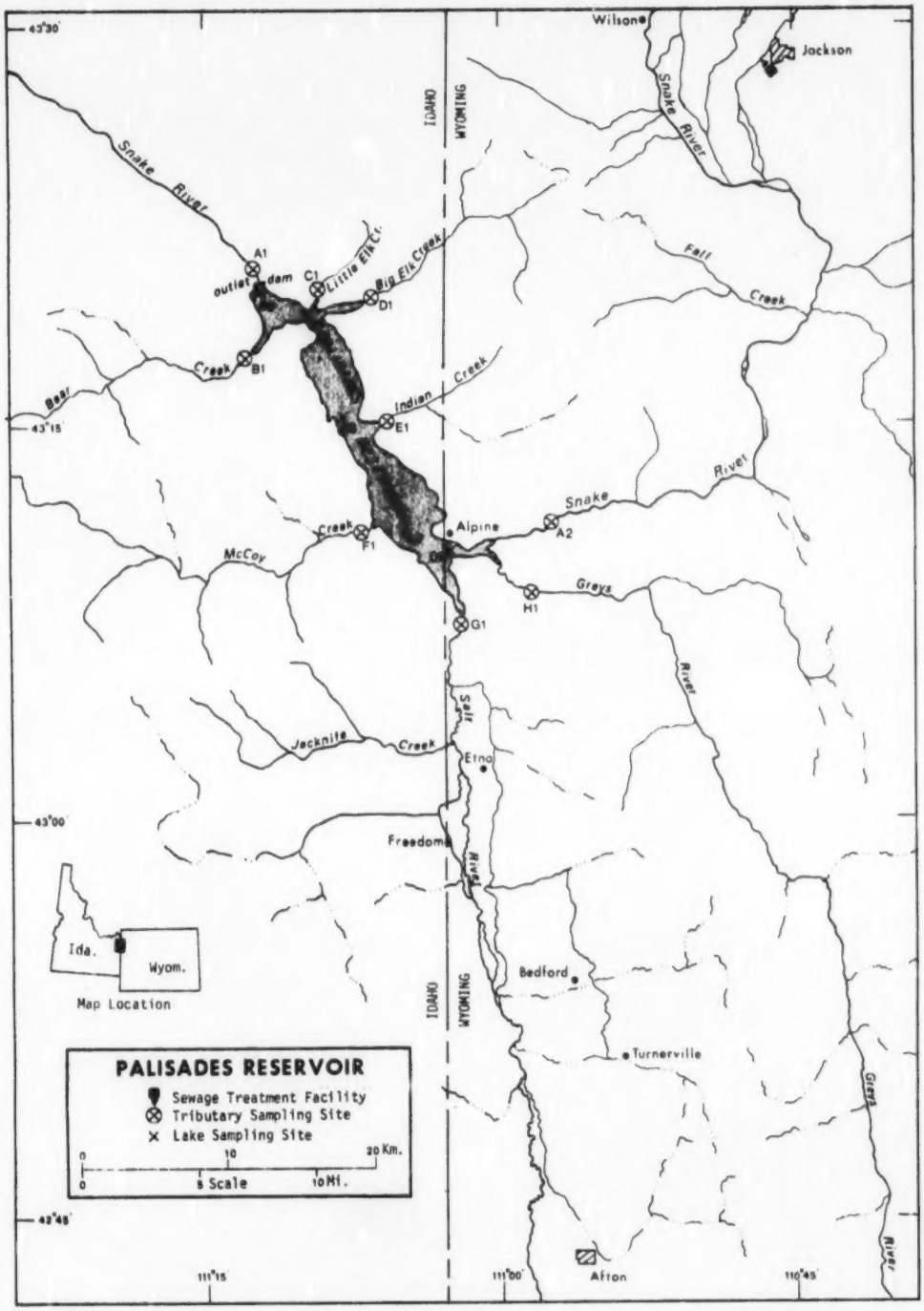
Major General James S. Brooks, Adjutant General of Idaho, and Project Officer Major Vestal L. Baker, who directed the volunteer efforts of the Idaho National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF IDAHO

LAKE NAME	COUNTY
American Falls Reservoir	Bannock, Bingham, Power
Cascade Reservoir	Valley
Coeur d'Alene Lake	Benewah, Kootenai
Dworshak Reservoir	Clearwater
Hauser Lake	Kootenai
Hayden Lake	Kootenai
Island Park Reservoir	Fremont
Lake Lowell (Deer Flat Reservoir)	Canyon
Magic Reservoir	Blaine, Camas
Palisades Reservoir	Bonneville (Lincoln in WY)
Payette Lake	Valley
Lower Twin Lake	Kootenai
Upper Twin Lake	Kootenai


43°30'
43°15'
43°00'
42°45'
111°15'
111°00'
110°45'
Wilson
Jackson
Snake River
IDAHO
WYOMING
Fall Creek
Big Elk Creek
Little Elk Cr.
outlet dam
A1
C1
D1
B1
Bear Creek
Indian Creek
E1
Alpine
A2
Snake River
McCoy Creek
F1
Greys River
H1
G1
Salt River
Jacknife Creek
Etna
Freedom
Bedford
Turnerville
Afton
Greys River
Ida.
Wyom.
Map Location
PALISADES RESERVOIR
Sewage Treatment Facility
Tributary Sampling Site
Lake Sampling Site
0
10
20 Km.
0
5 Scale
10 Mi.

REPORT ON PALISADES RESERVOIR, IDAHO

STORET NO. 1610

I. CONCLUSIONS

A. Trophic Condition:*

On the basis of Survey data and field observations, Palisades Reservoir is considered mesotrophic. Of the 13 Idaho lakes sampled in 1975, 6 had higher median total phosphorus (0.024 mg/l) levels, 1 had higher median inorganic nitrogen values (0.080 mg/l) and 9 had higher median orthophosphorus (0.007 mg/l) levels than Palisades Reservoir. Chlorophyll a levels ranged from 0.8 µg/l to 5.6 µg/l with a mean of 2.1 µg/l. Potential for primary production as measured by algal assay control yields was generally low.

Survey limnologists did not observe any problem conditions during their visits to the lake. The Idaho Department of Water Resources, et al. (1975) reports the stretch of the Snake River above Heise which includes Palisades Reservoir is high quality water, and in stable condition.

*See Appendix E

B. Rate-Limiting Nutrient:

The algal assay results indicate that Palisades Reservoir was colimited during September sampling (09/18/75) and phosphorus limited during October (10/20/75). The reservoir data suggest nitrogen limitation at all three sampling times.

C. Nutrient Controllability:

1. Point sources -

The city of Jackson was the only known point source impacting Palisades Reservoir during the sampling year. It is estimated that Jackson contributed less than 0.1% of the total phosphorus load to the lake.

The calculated annual phosphorus loading of 6.25 g $P/m^2/yr$ is over three times that proposed by Vollenweider (1975) as "eutrophic" for a lake with such volume and retention time. If the present loading continues, increasingly undesirable responses to enrichment are likely to occur.

2. Nonpoint sources -

Nonpoint sources contributed almost all of the known nutrient loading to Palisades Reservoir during the sampling year. The Snake River contributed 68.8% of the total phosphorus load, the Greys River contributed 14.9%, and Salt River contributed 13.1%. Ungaged drainage areas were estimated to have contributed 0.9% of the total. It is not known how much of the apparent nonpoint contributions from the Snake

River are in fact attributable to an underestimation of nutrient loadings from the community of Jackson.

The phosphorus export rates of Greys River were substantially greater during the sampling year than the other tributaries to Palisades Reservoir (Section IV-D). This inflation may be due to unidentified point sources rather than to nonpoint source inputs, but more extensive sampling is needed to determine the location and significance of these possible sources.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS

Lake and drainage basin characteristics are itemized below. Lake surface area, mean depth and volume were provided by Martin and Hanson (1966). Tributary flow data were provided by the Idaho District Office of the U.S. Geological Survey (USGS). Outlet drainage area includes the lake surface area. Mean hydraulic retention time was obtained by dividing the lake volume by mean flow of the outlet. Precipitation values are estimated by methods as outlined in NES Working Paper No. 175. A table of metric/English conversions is included as Appendix A.

A. Lake Morphometry:

1. Surface area: 61.31 km^2.
2. Mean depth: 28.2 meters.
3. Maximum depth: ?
4. Volume: 1,732.560 x 10^6 m^3.
5. Mean hydraulic retention time: 108 days.

B. Tributary and Outlet:
(See Appendix B for flow data)

1. Tributaries -

Name	Drainage area(km^2)	Mean flow (m^3/sec)
A-2 Snake River	8,984.7	128.99
B-1 Bear Creek	199.7	2.21
D-1 Big Elk Creek	153.3	1.96
E-1 Indian Creek	100.5	0.39
F-1 McCoy Creek	279.7	2.31
G-1 Salt River	2,198.9	21.42
H-1 Greys River	1,160.3	18.47
Minor tributaries and immediate drainage -	433.4	5.30
Total	13,510.5	181.05
2. Outlet - A-1 Snake River	13,571.6	185.83

C. Precipitation:

1. Year of sampling: 33.3 cm.
2. Mean annual: 27.4 cm.

III. LAKE WATER QUALITY SUMMARY

Palisades Reservoir was sampled three times during the open-water season of 1975 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from five stations on the lake and from a number of depths at each station (see map, page v). During each visit, depth-integrated samples were collected from each station for chlorophyll *a* analysis and phytoplankton identification and enumeration. During September and October sampling, 18.9-liter depth-integrated samples were composited for algal assays. Maximum depths sampled were 16.8 meters at Station 01, 8.5 meters at Station 02, 45.1 meters at Station 03, and 53.3 meters at Stations 04 and 05. For a more detailed explanation of NES methods, see NES Working Paper No. 175.

The results obtained are presented in full in Appendix C and are summarized in III-A for waters at the surface and at the maximum depth for each site. Results of the phytoplankton counts and chlorophyll *a* determinations are included in III-B. Results of the limiting nutrient study are presented in III-C.

PALISADES RESERVOIR
STORET CODE 1610

PHYSICAL AND CHEMICAL CHARACTERISTICS

PARAMETER	(8/ 5/75) S*** = 4 N*	RANGE	MEDIAN	MAX DEPTH RANGE (METERS)	(9/18/75) S*** = 4 N*	RANGE	MEDIAN	MAX DEPTH RANGE (METERS)	(10/20/75) S*** = 4 N*	RANGE	MEDIAN	MAX DEPTH RANGE (METERS)
TEMPERATURE (DEG CENT)												
0.-1.5 M DEPTH	8	20.2- 21.1	20.9	0.0- 1.5	8	16.2- 17.2	17.1	0.0- 1.5	8	13.8- 14.2	14.0	0.0- 1.5
MAX DEPTH**	4	10.0- 18.5	11.0	8.2- 53.3	4	12.2- 15.5	13.3	8.5- 53.3	4	11.9- 13.1	12.1	7.6- 51.8
DISSOLVED OXYGEN (MG/L)												
0.-1.5 M DEPTH	8	5.4- 8.8	7.8	0.0- 1.5	8	6.8- 8.0	7.6	0.0- 1.5	8	7.9- 8.4	8.1	0.0- 1.5
MAX DEPTH**	4	5.6- 7.6	7.5	8.2- 53.3	4	4.8- 7.4	6.0	8.5- 53.3	4	2.2- 8.6	8.1	7.6- 51.8
CONDUCTIVITY (UMHOS)												
0.-1.5 M DEPTH	8	230.- 235.	231.	0.0- 1.5	8	227.- 232.	230.	0.0- 1.5	8	201.- 207.	205.	0.0- 1.5
MAX DEPTH**	4	190.- 265.	208.	8.2- 53.3	4	200.- 248.	218.	8.5- 53.3	4	191.- 235.	214.	7.6- 51.8
PH (STANDARD UNITS)												
0.-1.5 M DEPTH	8	8.3- 8.7	8.6	0.0- 1.5	8	8.3- 8.5	8.4	0.0- 1.5	8	8.3- 8.5	8.4	0.0- 1.5
MAX DEPTH**	4	7.8- 8.7	8.3	8.2- 53.3	4	7.8- 8.3	7.9	8.5- 53.3	4	7.6- 8.4	8.1	7.6- 51.8
TOTAL ALKALINITY (MG/L)												
0.-1.5 M DEPTH	8	98.- 112.	110.	0.0- 1.5	8	109.- 114.	110.	0.0- 1.5	8	115.- 203.	122.	0.0- 1.5
MAX DEPTH**	4	111.- 117.	112.	8.2- 53.3	4	110.- 118.	113.	8.5- 53.3	4	115.- 144.	134.	7.6- 51.8
TOTAL P (MG/L)												
0.-1.5 M DEPTH	8	0.011-0.082	0.018	0.0- 1.5	8	0.020-0.033	0.028	0.0- 1.5	8	0.012-0.027	0.015	0.0- 1.5
MAX DEPTH**	4	0.013-0.127	0.020	8.2- 53.3	4	0.023-0.103	0.051	8.5- 53.3	4	0.012-0.044	0.025	7.6- 51.8
DISSOLVED ORTHO P (MG/L)												
0.-1.5 M DEPTH	8	0.003-0.018	0.008	0.0- 1.5	8	0.002-0.010	0.003	0.0- 1.5	8	0.005-0.007	0.006	0.0- 1.5
MAX DEPTH**	4	0.012-0.019	0.017	8.2- 53.3	4	0.002-0.023	0.015	8.5- 53.3	4	0.005-0.029	0.007	7.6- 51.8
NO2+NO3 (MG/L)												
0.-1.5 M DEPTH	8	0.020-0.020	0.020	0.0- 1.5	8	0.020-0.040	0.020	0.0- 1.5	8	0.040-0.080	0.065	0.0- 1.5
MAX DEPTH**	4	0.020-0.170	0.095	8.2- 53.3	4	0.040-0.180	0.135	8.5- 53.3	4	0.050-0.270	0.095	7.6- 51.8
AMMONIA (MG/L)												
0.-1.5 M DEPTH	8	0.020-0.040	0.020	0.0- 1.5	8	0.020-0.020	0.020	0.0- 1.5	8	0.020-0.020	0.020	0.0- 1.5
MAX DEPTH**	4	0.020-0.060	0.030	8.2- 53.3	4	0.020-0.050	0.020	8.5- 53.3	4	0.020-0.030	0.025	7.6- 51.8
KJELDAHL N (MG/L)												
0.-1.5 M DEPTH	8	0.200-0.300	0.200	0.0- 1.5	8	0.200-0.200	0.200	0.0- 1.5	8	0.200-0.200	0.200	0.0- 1.5
MAX DEPTH**	4	0.200-0.200	0.200	8.2- 53.3	4	0.200-0.200	0.200	8.5- 53.3	4	0.200-0.200	0.200	7.6- 51.8
SECCHI DISC (METERS)	3	2.1- 4.8	2.7		4	4.0- 5.5	4.6		4	4.6- 6.1	5.1	

* N = NO. OF SAMPLES
** MAXIMUM DEPTH SAMPLED AT EACH SITE
*** S = NO. OF SITES SAMPLED ON THIS DATE

B. Biological Characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal Units per ml
08/05/75	1. Chroomonas	339
	2. Asterionella	242
	3. Cryptomonas	97
	4. Ceratium	48
	5. Chlamydomonas	48
	Other genera	98
	Total	872
09/18/75	1. Aphanizomenon	237
	2. Chroomonas	142
	3. Asterionella	47
	Other genera	---
	Total	426
10/20/75	1. Aphanizomenon	638
	2. Chroomonas	478
	3. Cryptomonas	478
	4. Melosira	319
	5. Asterionella	53
	Other genera	53
	Total	2,019

2. Chlorophyll *a* -

Sampling Date	Station Number	Chlorophyll *a* (µg/l)
08/05/75	01	0.8
	02	3.1
	03	1.4
	04	1.4
	05	1.0
09/18/75	01	5.6
	02	2.4
	03	1.7
	04	2.4
	05	1.6
10/20/75	01	4.2
	02	2.3
	03	1.3
	04	0.9
	05	0.9

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

a. 09/18/75 Stations 01-03

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum Yield (mg/l-dry wt.)
Control	0.015	0.075	1.8
0.05 P	0.065	0.075	2.4
0.05 P + 1.0 N	0.065	1.075	6.2
1.00 N	0.015	1.075	2.9

Stations 04-05

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum Yield (mg/l-dry wt.)
Control	0.005	0.050	0.3
0.05 P	0.055	0.050	1.0
0.05 P + 1.0 N	0.055	1.050	16.8
1.00 N	0.005	1.050	0.2

b. 10/20/75 Stations 01-03

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum Yield (mg/l-dry wt.)
Control	0.005	0.070	0.3
0.05 P	0.055	0.070	2.3
0.05 P + 1.0 N	0.055	1.070	25.5
1.00 N	0.005	1.070	0.3

2. Discussion -

The control yields of the assay alga, Selenastrum capricornutum, indicate that the potential for primary production in Palisades Reservoir was low during September for sampling Stations 04, 05, and during October for Stations 01-03, but high in September for Stations 01-03. In the October and September (Stations 04, 05) assays, the addition of orthophosphorus alone produced a significant increase in yield over that of the control, indicating phosphorus limitation. The addition of nitrogen alone did not result in any increase in yield over that of the control in those samples. In the September (Stations 01-03) assay, a growth increase accompanied the addition of either phosphorus or nitrogen alone, suggesting colimitation by the two nutrients.

The mean inorganic nitrogen to orthophosphorus ratios (N/P) in the lake data were less than 13/1 on all sampling occasions, suggesting nitrogen limitation in the lake (a mean N/P ratio of 14/1 or greater generally reflects phosphorus limitation).

IV. NUTRIENT LOADINGS
(See Appendix D for data)

For the determination of nutrient loadings, the Idaho National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v), except for the high runoff month of June when two samples were collected. Sampling was begun in October 1974, and was completed in September 1975.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the Idaho District Office of the USGS for the tributary sites nearest the lake.

In this report, nutrient loads for sampled tributaries were determined by using a modification of a USGS computer program for calculating stream loadings. Nutrient loads indicated for tributaries are those measured minus known point source loads, if any.

Nutrient loadings for unsampled "minor tributaries and immediate drainage" ("ZZ" of USGS) were estimated by using the mean annual nutrient loads, in $kg/km^2/year$, in Big Elk Creek, Indian Creek and McCoy Creek at Stations D-1, E-1 and F-1 and multiplying the means by the ZZ area in km^2.

Nutrient loads for the Jackson wastewater treatment plant were estimated at 1.134 kg P and 3.401 kg N/capita/year.

A. Waste Sources:

1. Known municipal -

Name	Pop.* Served	Treatment*	Mean Flow ($m^3/d \times 10^3$)	Receiving Water
Jackson	1440	Primary	3.407**	Flat Creek/ Snake River

3. Known industrial - None

*U.S. EPA, 1971.
**Wagner, personal communication.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/yr	% of total
a. Tributaries (nonpoint load) -		
A-2 Snake River	263,715	68.8
B-1 Bear Creek	3,775	1.0
D-1 Big Elk Creek	1,705	0.4
E-1 Indian Creek	1,035	0.3
F-1 McCoy Creek	1,180	0.3
G-1 Salt River	49,860	13.1
H-1 Greys River	57,260	14.9
b. Minor tributaries and immediate drainage (nonpoint load) -	3,465	0.9
c. Known municipal STP's -		
Jackson	165	<0.1
d. Septic tanks* -	10	<0.1
e. Known industrial - None		
f. Direct precipitation** -	1,075	0.3
Totals	383,245	100.0%

2. Output - A-1 Snake River 126,270

3. Net annual P accumulation - 256,975

*Estimate based on 30 lakeshore residences and 2 camps.
**Estimated (See NES Working Paper No. 175).

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source		kg N/yr	% of total
a.	Tributaries (nonpoint load) -		
	A-2 Snake River	2,346,350	65.3
	B-1 Bear Creek	24,435	0.7
	D-1 Big Elk Creek	26,350	0.7
	E-1 Indian Creek	13,160	0.4
	F-1 McCoy Creek	21,525	0.6
	G-1 Salt River	824,330	23.1
	H-1 Greys River	207,995	5.8
b.	Minor tributaries and immediate drainage (nonpoint load) -	55,040	1.5
c.	Known municipal STP's -		
	Jackson	4,895	0.1
d.	Septic tanks* -	460	<0.1
e.	Known industrial - None		
f.	Direct precipitation** -	66,190	1.8
	Totals	3,590,730	100.0%

2. Outputs - A-1 Snake River 2,920,000

3. Net annual N accumulation - 670,730

*Estimate based on 30 lakeshore residences and 2 camps.
**Estimated (See NES Working Paper No. 175).

D. Mean Annual Nonpoint Nutrient Export by Subdrainage Area:

Tributary	kg P/km^2/yr	kg N/km^2/yr
Snake River	29	261
Bear Creek	19	122
Big Elk Creek	11	172
Indian Creek	10	131
McCoy Creek	4	77
Salt River	23	375
Greys River	49	179

E. Mean Nutrient Concentrations in Ungaged Streams:

Tributary	Mean Total P (mg/l)	Mean Total N (mg/l)
C-1 Little Elk Creek	0.020	0.259

F. Yearly Loadings:

In the following table, the existing phosphorus loading is compared to the relationship proposed by Vollenweider (1975). Essentially, his "eutrophic" loading is that at which the receiving waters would become eutrophic or remain eutrophic; his "oligotrophic" loading is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A "mesotrophic" loading would be considered one between "eutrophic" and "oligotrophic."

Note that Vollenwieder's model may not be applicable to water bodies with very short retention times or in which light penetration is severely restricted from high concentrations of suspended solids in the surface waters.

	Total Yearly Phosphorus Loading ($g/m^2/yr$)
Estimated loading for Palisades Reservoir	6.25
Vollenweider's "eutrophic" loading	1.84
Vollenweider's "oligotrophic" loading	0.92

V. LITERATURE REVIEWED

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VI. APPENDICES

APPENDIX A

CONVERSION FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX B

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR IDAHO 08/23/76

LAKE CODE 1610 PALISADES RESERVOIR

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 13571.6

TRIBUTARY	SUB-DRAINAGE AREA(SQ KM)	NORMALIZED FLOWS(CMS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
1610A1	13571.6	60.31	67.39	86.65	163.39	355.94	432.96	374.92	269.29	188.87	95.43	65.70	61.16	185.83
1610A2	8984.7	42.19	47.86	52.39	88.91	246.64	372.08	250.89	159.42	119.21	61.16	52.95	50.12	128.99
1610B1	199.7	0.62	0.62	0.74	3.48	8.89	5.47	2.24	1.27	0.96	0.79	0.71	0.68	2.21
1610D1	153.3	0.68	0.62	0.62	1.19	5.58	6.48	2.63	1.61	1.25	1.08	0.91	0.79	1.96
1610E1	100.5	0.0	0.0	0.0	0.028	1.019	2.718	0.708	0.085	0.057	0.028	0.006	0.0	0.387
1610F1	279.7	0.42	0.42	0.62	5.69	11.61	4.64	1.53	0.71	0.54	0.48	0.45	0.48	2.31
1610G1	2198.9	13.14	12.86	12.83	25.74	45.59	35.96	22.85	18.35	19.09	17.84	17.19	15.21	21.42
1610H1	1160.3	6.20	5.92	6.23	16.71	53.24	60.31	26.25	13.28	10.28	8.72	7.39	6.63	18.47
1610H1	494.7	1.67	1.61	1.76	8.50	16.42	15.01	6.09	3.31	2.72	2.35	2.10	1.90	5.30

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 13571.6
SUM OF SUB-DRAINAGE AREAS = 13571.8
TOTAL FLOW IN = 2167.22
TOTAL FLOW OUT = 2222.02

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
1610A1	10	74	115.533	20	94.295				
	11	74	88.632	3	90.331				
	12	74	71.840	15	71.642				
	1	75	75.691	12	74.756				
	2	75	71.047	9	68.527				
	3	75	155.261	9	67.960				
	4	75	297.327	13	339.802				
	5	75	317.149	4	339.802				
	6	75	319.980	1	370.951	14	370.951		
	7	75	418.523	12	526.693				
	8	75	264.649	10	286.000				
	9	75	204.986	14	209.545				
1610A2	10	74	60.768	20	57.200				
	11	74	52.131	3	57.483				
	12	74	48.025	15	47.572				
	1	75	49.526	12	47.572				
	2	75	44.486	9	45.590				
	3	75	43.976	9	45.307				
	4	75	53.292	13	43.608				
	5	75	227.271	4	167.353				
	6	75	399.834	1	254.002	14	472.891		
	7	75	363.022	12	399.267				
	8	75	196.094	10	209.545				
	9	75	111.682	14	123.178				

TRIBUTARY FLOW INFORMATION FOR IDAHO 08/23/76

LAKE CODE 1610 PALISADES RESERVOIR

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
161081	10	74	1.048	20	1.019				
	11	74	0.850	3	0.963				
	12	74	0.736	15	0.708				
	1	75	0.680	12	0.623				
	2	75	0.595	9	0.623				
	3	75	0.566	9	0.623				
	4	75	0.651	13	0.566				
	5	75	3.002						
	6	75	7.787	1	7.221	14	9.203		
	7	75	5.465	12	6.796				
	8	75	1.869	10	1.982				
	9	75	1.246	14	1.246				
1610D1	10	74	1.642	20	1.557				
	11	74	1.331	3	1.501				
	12	74	1.161	15	1.133				
	1	75	1.076	12	0.991				
	2	75	0.934	9	1.019				
	3	75	0.934	9	1.019				
	4	75	1.019	13	0.934				
	5	75	4.389						
	6	75	10.704	1	9.968	12	9.741	14	12.544
	7	75	7.702						
	8	75	2.832	10	2.973				
	9	75	1.926	14	1.926				
1610E1	10	74	0.142	20	0.113				
	11	74	0.0	3	0.0				
	12	74	0.0	15	0.0				
	1	75	0.0	12	0.0				
	2	75	0.057	9	0.057				
	3	75	0.057	9	0.057				
	4	75	0.057	13	0.057				
	5	75	0.623						
	6	75	2.464	1	2.180	12	2.124	14	3.115
	7	75	1.472						
	8	75	0.311	10	0.340				
	9	75	0.170	14	0.170				
1610F1	10	74	1.472	20	1.388				
	11	74	1.104	3	1.303				
	12	74	0.934	15	0.906				
	1	75	0.850	12	0.736				
	2	75	0.708	9	0.765				
	3	75	0.680	9	0.765				
	4	75	0.793	13	0.680				
	5	75	5.607						
	6	75	18.887	1	17.103	14	23.390		
	7	75	12.035	12	15.857				
	8	75	3.087	10	3.285				
	9	75	1.812	14	1.812				

TRIBUTARY FLOW INFORMATION FOR IDAHO 08/23/76

LAKE CODE 1610 PALISADES RESERVOIR

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
161061	10	74	18.406	20	17.726				
	11	74	18.066	3	20.133				
	12	74	15.093	15	15.461				
	1	75	13.479	12	12.488				
	2	75	12.884	9	12.969				
	3	75	13.819	9	13.677				
	4	75	16.990	13	14.215				
	5	75	51.961	4	35.962				
	6	75	76.993	1	84.667	12	75.606	14	71.642
	7	75	51.225						
	8	75	25.372	10	24.919				
	9	75	22.540	14	23.730				
1610H1	10	74	10.817	20	10.392				
	11	74	8.722	3	9.911				
	12	74	7.646	15	7.504				
	1	75	7.079	12	6.513				
	2	75	6.173	9	6.654				
	3	75	6.003	9	6.626				
	4	75	6.739	13	6.088				
	5	75	30.101						
	6	75	75.974	1	70.509	12	68.810	14	89.481
	7	75	53.915						
	8	75	19.086	10	20.105				
	9	75	12.799	14	12.771				

APPENDIX C

PHYSICAL AND CHEMICAL DATA

STORET RETRIEVAL DATE 76/08/25
NATL EUTROPHICATION SURVEY
EPA-LAS VEGAS

161001
43 10 20.0 111 02 12.0 3
PALISADES RESERVOIR
56023 IDAHO

11EPALES 751117 2111202
0059 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
75/08/05	13 50	0000	20.2	6.2	78	243	7.90	118	0.200	0.500	0.020K	0.022
	13 50	0005	20.6	8.8		240	8.80	117	0.040	0.200K	0.020K	0.019
	13 50	0015	18.0	7.8		213	8.40	97	0.020K	0.200K	0.020K	0.018
	13 50	0035	16.5	7.6		215		106	0.020	0.200K	0.020K	0.016
	13 50	0055	15.9	6.8		235	8.40	117	0.020	0.200K	0.020K	0.008
75/09/18	11 30	0000	15.9	8.2	60	234	8.60	112	0.020K	0.200	0.020K	0.006
	11 30	0005	15.8	8.2			8.60	112	0.020K	0.200	0.020K	0.004
	11 30	0015	15.7	8.4		233	8.50	111	0.020K	0.200	0.020K	0.003
	11 30	0030	14.9	8.2		234	8.50	110	0.020K	0.200K	0.020K	0.003
	11 30	0039	12.7	7.8		238	8.40	109	0.020K	0.200K	0.020K	0.004
75/10/20	11 30	0000	13.3	9.0	96	201	8.60	123	0.020K	0.200	0.020	0.007
	11 30	0005	13.2	9.0		201		118	0.020K	0.200	0.020	0.007
	11 30	0013	13.1	8.9		201	8.60	119	0.030	0.200	0.020	0.012

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT RFLNING PERCENT
75/08/05	13 50	0000	0.190	0.8	
	13 50	0005	0.020		
	13 50	0015	0.019		
	13 50	0035	0.020		
	13 50	0055	0.027		
75/09/18	11 30	0000	0.037	5.6	
	11 30	0005	0.036		
	11 30	0015	0.045		
	11 30	0030	0.041		
	11 30	0039	0.026		
75/10/20	11 30	0000	0.035	4.2	
	11 30	0005	0.032		
	11 30	0013	0.026		

K VALUE KNOWN TO BE LESS
THAN INDICATED

STORET RETRIEVAL DATE 76/08/25
NATL EUTROPHICATION SURVEY
FPA-LAS VEGAS

161002
43 11 06.0 111 04 37.0 3
PALISADES RESERVOIR
16019 IDAHO

11EPALES 2111202
0031 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
75/08/05	14 20	0000	20.9	8.8	84	233	8.30	98	0.020	0.200K	0.020K	0.018
	14 20	0005	20.2	8.2		231	8.70	112	0.020	0.200K	0.020K	0.013
	14 20	0027	18.5	7.6		223	8.50	112	0.020K	0.200K	0.020K	0.012
75/09/18	11 50	0000	16.2	7.6	156	231	8.35	109	0.020K	0.200K	0.040	0.003
	11 50	0005	16.2	7.4		232	8.35	109	0.020K	0.200K	0.040	0.003
	11 50	0015	16.1	7.6		232	8.40	111	0.020K	0.200K	0.040	0.002
	11 50	0028	15.5	7.4		232	8.35	110	0.020K	0.200K	0.040	0.002
75/10/20	11 55	0000	13.9	8.4	180	205	8.50	203	0.020K	0.200K	0.040	0.006
	11 55	0005	13.8	8.1		205	8.45	123	0.020K	0.200K	0.050	0.007
	11 55	0025	13.1	8.3		203	8.40	115	0.020K	0.200K	0.050	0.005

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
75/08/05	14 20	0000	0.082	3.1	
	14 20	0005	0.018		
	14 20	0027	0.013		
75/09/18	11 50	0000	0.033	2.4	
	11 50	0005	0.028		
	11 50	0015	0.026		
	11 50	0028	0.023		
75/10/20	11 55	0000	0.015	2.3	
	11 55	0005	0.014		
	11 55	0025	0.012		

K VALUE KNOWN TO BE LESS
THAN INDICATED

STORET RETRIEVAL DATE 76/08/25
NATL EUTROPHICATION SURVEY
EPA-LAS VEGAS

161003
43 14 42.0 111 07 47.0 3
PALISADES RESERVOIR
16019 IDAHO

11EPALES 2111202
0150 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
75/08/05	14 45	0000	21.1	7.4	108	230	8.70	105	0.020	0.200K	0.020K	0.011
	14 45	0005	20.9	8.0		233	8.60	109	0.020K	0.200	0.020K	0.012
	14 45	0015	20.2	8.4		221	8.80	108	0.020K	0.200	0.020K	0.012
	14 45	0025	19.2	7.2		223	8.30	109	0.030	0.200K	0.050	0.015
	14 45	0050	16.3	6.8		215	8.20	105	0.040	0.200K	0.080	0.015
	14 45	0100	14.0	6.8		191	7.80	110	0.030	0.200K	0.150	0.017
	14 45	0146	11.8	5.6		265	7.80	117	0.060	0.200K	0.170	0.016
75/09/18	12 25	0000	17.2	7.8	204	231	8.55	109	0.020K	0.200K	0.020K	0.002
	12 25	0005	17.1	8.0		229	8.50	109	0.020K	0.200K	0.020K	0.002K
	12 25	0026	16.9	7.8		228	8.50	111	0.020K	0.200K	0.020K	0.002K
	12 25	0060	16.2	7.0		231	8.30	110	0.030	0.200	0.060	0.011
	12 25	0095	15.1	7.4		239	8.70	111	0.020K	0.200K	0.100	0.009
	12 25	0135	14.8	7.2		248	8.15	116	0.040	0.200K	0.090	0.008
	12 25	0148	14.1	7.0		248	8.10	118	0.050	0.200K	0.090	0.009
75/10/20	12 20	0000	14.1	8.4	192	205	8.40	115	0.020K	0.200K	0.060	0.005
	12 20	0005	14.0	8.2		207	8.40	118	0.020K	0.200K	0.060	0.005
	12 20	0020	14.0	8.3		205	8.50	119	0.020K	0.200K	0.550	0.006
	12 20	0043	13.8	8.4		201	8.45	124	0.020K	0.200	0.040	0.009
	12 20	0085	13.6	8.6		202	8.40	126	0.020K	0.200	0.050	0.008
	12 20	0126	11.9	8.6		235	8.20	144	0.030	0.200	0.090	0.007

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT RFMNING PERCENT
75/08/05	14 45	0000	0.031	1.4	
	14 45	0005	0.019		
	14 45	0015	0.014		
	14 45	0025	0.014		
	14 45	0050	0.023		
	14 45	0100	0.033		
	14 45	0146	0.127		
75/09/18	12 25	0000	0.020	1.7	
	12 25	0005	0.028		
	12 25	0026	0.022		
	12 25	0060	0.039		
	12 25	0095	0.037		
	12 25	0135	0.057		
	12 25	0148	0.103		
75/10/20	12 20	0000	0.027	1.3	
	12 20	0005	0.020		
	12 20	0020	0.012		
	12 20	0043	0.013		
	12 20	0085	0.012		
	12 20	0126	0.034		

K VALUE KNOWN TO BE LESS THAN INDICATED

STORET RETRIEVAL DATE 76/08/25
NATL EUTROPHICATION SURVEY
EPA-LAS VEGAS

161004
43 18 56.0 111 10 00.0 3
PALISADES RESERVOIR
16019 IDAHO

11EPALES 2111202
0215 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
75/08/05	15 20	0000	20.2	8.6		231	8.70	109	0.020	0.200K	0.020K	0.005
	15 20	0005	20.9	7.6		231	8.60	111	0.040	0.200K	0.020K	0.003
	15 20	0025	19.8	7.2		221	8.20	107	0.030	0.200K	0.050	0.005
	15 20	0050	16.2	7.2		203	8.20	105	0.020	0.200K	0.070	0.011
	15 20	0085	14.8	7.8		190	8.10	104	0.020K	0.200K	0.080	0.012
	15 20	0120	13.2	7.4		181	8.10	104	0.020K	0.200K	0.110	0.014
	15 20	0170	10.3	7.4		193	8.00	112	0.020	0.200	0.150	0.018
75/09/18	12 50	0000	17.0	7.6	156	228	8.45	112	0.020K	0.200K	0.020K	0.003
	12 50	0005	17.1	7.6		228	8.50	111	0.020K	0.200K	0.020K	0.002
	12 50	0027	16.9	8.0		227	8.50	112	0.020K	0.200K	0.020K	0.002
	12 50	0050	16.2	6.8		229	8.30	112	0.020K	0.200K	0.050	0.004
	12 50	0080	15.3	7.8		230	8.20	111	0.020K	0.200K	0.080	0.007
	12 50	0110	14.9	6.8		230	8.10	111	0.020K	0.200K	0.100	0.010
	12 50	0140	14.3	6.4		228	7.95	113	0.020K	0.200K	0.130	0.012
	12 50	0175	12.2	4.8		204	7.80	111	0.020K	0.200K	0.180	0.022
75/10/20	12 45	0000	14.2	7.9	240	201	8.30	120	0.020K	0.200	0.070	0.006
	12 45	0005	14.1	8.0		207	8.30	120	0.020K	0.200K	0.070	0.005
	12 45	0020	14.1	8.4		205	8.30	123	0.020K	0.200K	0.080	0.006
	12 45	0055	14.1	8.0		205	8.20	122	0.020K	0.200K	0.070	0.005
	12 45	0100	13.6	7.6		219	8.20	133	0.020K	0.200K	0.100	0.007
	12 45	0135	12.9	8.0		223	8.20	131	0.020K	0.200K	0.100	0.007
	12 45	0170	12.3	8.0		225	8.10	133	0.030	0.200K	0.100	0.007

K VALUE KNOWN TO BE LESS
THAN INDICATED

STORET RETRIEVAL DATE 76/05/25
NATL EUTROPHICATION SURVEY
EPA-LAS VEGAS

161004
43 18 56.0 111 10 00.0 3
PALISADES RESERVOIR
16019 IDAHO

11EPALES 2111202
0215 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
75/08/05	15 20	0000	0.020	1.4	
	15 20	0005	0.013		
	15 20	0025	0.012		
	15 20	0050	0.014		
	15 20	0085	0.020		
	15 20	0120	0.021		
	15 20	0170	0.027		
75/09/18	12 50	0000	0.028	2.4	
	12 50	0005	0.025		
	12 50	0027	0.026		
	12 50	0050	0.026		
	12 50	0080	0.030		
	12 50	0110	0.039		
	12 50	0140	0.045		
	12 50	0175	0.055		
75/10/20	12 45	0000	0.013	0.9	
	12 45	0005	0.012		
	12 45	0020	0.013		
	12 45	0055	0.013		
	12 45	0100	0.013		
	12 45	0135	0.016		
	12 45	0170	0.016		

STORET RETRIEVAL DATE 76/08/25
NATL EUTROPHICATION SURVEY
EPA-LAS VEGAS

161005
43 19 47.0 111 12 17.0 3
PALISADES RESERVOIR
16019 IDAHO

11EPALES 2111202
0180 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
75/08/05	15 50	0000	20.9	7.6	188	235	8.60	110	0.020K	0.300	0.020K	0.004
	15 50	0005	20.9	5.4		230	8.60	110	0.020K	0.200	0.020K	0.004
	15 50	0020	20.3	7.2		230	8.80	110	0.040	0.200K	0.020	0.023K
	15 50	0035	20.3	9.4		230	8.40	105	0.040	0.200K	0.060	0.017
	15 50	0060	15.3	7.6		194	8.40	104	0.040	0.200K	0.080	0.016
	15 50	0105	14.4	5.6		188	8.20	108	0.030	0.200K	0.110	0.021
	15 50	0140	11.8	7.2		188	8.10	114	0.020	0.200K	0.160	0.020
	15 50	0175	10.0	7.6		190	8.70	111	0.040	0.200K	0.040	0.019K
75/09/18	13 25	0000	17.1	7.8	216	230	8.35	112	0.020K	0.200K	0.020K	0.005
	13 25	0005	17.1	6.8		227	8.45	114	0.020K	0.200K	0.020K	0.010
	13 25	0026	17.0	7.2		228	8.40	114	0.020K	0.200K	0.020K	0.004
	13 25	0050	15.9	6.6		232	8.15	115	0.020K	0.200K	0.080	0.005
	13 25	0080	15.0	6.4		228	8.00	114	0.020K	0.200K	0.110	0.011
	13 25	0110	14.7	6.4		232	7.95	114	0.020K	0.200K	0.120	0.011
	13 25	0140	14.3	6.4		230	7.95	117	0.020K	0.200K	0.120	0.012
	13 25	0175	12.5	5.0		200	7.75	114	0.020K	0.200K	0.140	0.023
75/10/20	13 15	0000	14.0	8.4	206	205	8.35	124	0.020K	0.200K	0.080	0.006
	13 15	0005	14.0	7.9		205	8.25	124	0.020K	0.200K	0.080	0.007
	13 15	0020	14.0	8.2		205	8.20	125	0.020K	0.200K	0.080	0.006
	13 15	0055	14.0	7.8		205	8.25	123	0.020K	0.200K	0.070	0.006
	13 15	0095	14.0	8.0		203	8.20	125	0.020K	0.200K	0.040	0.005
	13 15	0130	13.0	5.2		219	7.85	139	0.020K	0.200K	0.160	0.016
	13 15	0170	12.0	2.2		191	7.65	134	0.020K	0.200K	0.270	0.029

K VALUE KNOWN TO BE LESS
THAN INDICATED

STORET RETRIEVAL DATE 76/08/25
NATL EUTROPHICATION SURVEY
EPA-LAS VEGAS

161005
43 19 47.0 111 12 17.0 3
PALISADES RESERVOIR
16019 IDAHO

11EPALES 2111202
0180 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
75/08/05	15 50	0000	0.011	1.0	
	15 50	0005	0.013		
	15 50	0020	0.014		
	15 50	0035	0.018		
	15 50	0060	0.020		
	15 50	0105	0.021		
	15 50	0140	0.028		
	15 50	0175	0.013		
75/09/18	13 25	0000	0.028	1.6	
	13 25	0005	0.032		
	13 25	0026	0.026		
	13 25	0050	0.026		
	13 25	0080	0.026		
	13 25	0110	0.031		
	13 25	0140	0.032		
	13 25	0175	0.048		
75/10/20	13 15	0000	0.015	0.9	
	13 15	0005	0.019		
	13 15	0020	0.014		
	13 15	0055	0.015		
	13 15	0095	0.014		
	13 15	0130	0.028		
	13 15	0170	0.044		

APPENDIX D

TRIBUTARY AND WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 76/08/25
NATL EUTROPHICATION SURVEY
EPA- LAS VEGAS

1610A1
43 20 22.0 111 12 22.0 4
SNAKE RIVER
16 7.5 PALISADES DM
O/PALISADES RESERVOIR 130691
BNK BELO DAM 1 MI SE OF PALISADES TWNSTE
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/10/20	10 50		0.120	0.100K	0.015	0.010	0.010
74/11/03	13 35		0.160	0.100K	0.065	0.025	0.025
74/12/15	15 30		0.144	0.100	0.015	0.010	0.010
75/01/12	09 30		0.160	0.100K	0.020	0.010	0.010
75/02/09	10 30		0.176	0.200	0.024	0.008K	0.010
75/03/09	11 13		0.200	0.050	0.005	0.005	0.010K
75/04/13	11 04		0.185	1.300	0.015	0.005	0.010K
75/05/04	07 25		0.185	1.050	0.055	0.010	0.010
75/06/01	14 30		0.180	0.100	0.030	0.015	0.040
75/06/14	10 25		0.125	0.250	0.020	0.020	0.050
75/07/12	16 15		0.090	0.500	0.015	0.015	0.020
75/08/10	09 00		0.090	0.100	0.020	0.015	0.015
75/09/14	09 10		0.105	0.200	0.015	0.045	0.090

K VALUE KNOWN TO BE LESS
THAN INDICATED

STORET RETRIEVAL DATE 76/08/25
NATL EUTROPHICATION SURVEY
EPA- LAS VEGAS

1610A2
43 04 07.0 111 57 22.0 4
SNAKE RIVER
16 7.5 FERRY PEAK
T/PALISADES RESERVOIR 130691
BNK 100 FT S OF US RT 26/89
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/10/20	15	35	0.040	0.300	0.010	0.005K	0.005
74/11/03	14	45	0.056	0.100K	0.020	0.010	0.010
74/12/15	12	13	0.228	0.100K	0.022	0.005	0.010K
75/01/12	10	45	0.040	0.100K	0.015	0.005	0.010
75/03/09	10	15	0.070	1.350	0.020	0.005	0.010
75/04/13	10	21	0.010	1.550	0.020	0.010	0.020
75/05/04	09	05	0.035	0.950	0.020	0.012	0.080
75/06/01	13	30	0.050		0.047	0.010	0.095
75/06/14	13	15	0.045	0.400	0.010	0.015	
75/07/12	12	00	0.060	0.700	0.030	0.015	0.170
75/08/10	12	40	0.020	0.150	0.055	0.005	0.020
75/09/14	10	00	0.030	0.200	0.010	0.010	0.020

K VALUE KNOWN TO BE LESS
THAN INDICATED

STORET RETRIEVAL DATE 76/08/25
NATL EUTROPHICATION SURVEY
EPA- LAS VEGAS

161081
43 16 58.0 111 13 17.0 4
BEAR CREEK
16 7.5 PALISADES DM
T/PALISADES RESERVOIR 130691
BNK FRM SEC RD 2.7 MI SE OF DAM
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/10/20	11	30	0.048	0.300	0.010	0.005	0.005
74/11/03	13	10	0.008	0.100K	0.015	0.010	0.010
74/12/15	12	10	0.096	0.300	0.015	0.010	0.030
75/06/14	11	15	0.060	0.950	0.025	0.040	0.120
75/07/12	10	30	0.025	0.200	0.010	0.020	0.050
75/08/10	09	25	0.010	0.150	0.025	0.010	0.020
75/09/14	09	20	0.045	0.200	0.005	0.010	0.020

K VALUE KNOWN TO BE LESS
THAN INDICATED

STORET RETRIEVAL DATE 76/08/25
NATL EUTROPHICATION SURVEY
EPA- LAS VEGAS

1610C1
43 19 40.0 111 09 11.0 4
LITTLE ELK CREEK
16 7.5 PALISADES DM
T/PALISADES RESERVOIR 130691
BNK FRM UNPVD RD 3.3 MI SE OF DAM
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/10/20	17 20		0.056	0.100	0.005	0.010	0.015
74/11/03	14 00		0.064	0.100K	0.015	0.010	0.015
74/12/15	10 50		0.136	0.100	0.015	0.010	0.020
75/06/01	14 30		0.100	0.200	0.015	0.010	0.030
75/06/14	11 55		0.085	0.400	0.005K	0.015	0.030
75/07/12	16 00		0.045	0.150	0.010	0.005	0.010
75/08/10	11 20		0.030	0.150	0.025	0.005K	0.010K
75/09/14	11 20		0.060	0.100K	0.005K	0.010	0.020

K VALUE KNOWN TO BE LESS
THAN INDICATED

STORET RETRIEVAL DATE 76/08/25
NATL EUTROPHICATION SURVEY
EPA- LAS VEGAS

1610D1
43 19 28.0 111 06 35.0 4
BIG ELK CREEK
16 7.5 MOUNT BAIRD
T/PALISADES RESERVOIR 130891
UNPVD RD BRDG .1 MI W OF YMCA CAMP
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/10/20	16 55		0.024	0.400	0.025	0.005	0.010
74/11/03	14 15		0.040	0.100K	0.015	0.010	0.015
74/12/15	11 15		0.232	0.200	0.010	0.015	0.020
75/01/12	10 05		0.192	0.200	0.010	0.015	0.015
75/06/01	19 15		0.105	0.150	0.020	0.020	0.080
75/06/12	15 50		0.115	0.590	0.045	0.020	0.040
75/06/14	12 20		0.140	0.337	0.020	0.025	
75/08/10	11 40		0.110	0.150	0.020	0.005	0.015
75/09/14	11 15		0.150	0.600	0.010	0.010	0.020

K VALUE KNOWN TO BE LESS
THAN INDICATED

STORET RETRIEVAL DATE 76/08/25
NATL EUTROPHICATION SURVEY
EPA- LAS VEGAS

1610E1
43 14 55.0 111 06 00.0 4
INDIAN CREEK
16 7.5 ALPINE
T/PALISADES RESERVOIR 130691
US RT 26 BRDG 4 M NW ST LINE
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/10/20	16	25	0.072	0.300	0.015	0.005K	0.005K
75/06/01	13	55	0.120	0.700	0.025	0.011	0.020
75/06/12	12	30	0.280	0.620	0.015	0.025	
75/06/14	12	50	0.160	0.350	0.005	0.015	0.120
75/08/10	12	15	0.050	0.150	0.025	0.005	0.010K
75/09/14	11	05	0.065	0.100	0.010	0.010	0.030

K VALUE KNOWN TO BE LESS
THAN INDICATED

STORET RETRIEVAL DATE 76/08/25
NATL EUTROPHICATION SURVEY
EPA- LAS VEGAS

1610F1
43 10 50.0 111 06 58.0 4
MCCOY CREEK
16 7.5 ALPINE
T/PALISADES RESERVOIR 130691
BNK .9 MI W OF MCCOY CRK CAMPGROUND
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/10/20	12 45		0.008	0.600	0.005	0.010	0.010
74/11/03	15 05		0.008	0.100K	0.020	0.015	0.015
74/12/15	14 20		0.048	0.100	0.010	0.015	0.020
75/08/10	10 15		0.005	0.150	0.075	0.010	0.020
75/09/14	09 25		0.025	0.400	0.005K	0.010	0.020

K VALUE KNOWN TO BE LESS THAN INDICATED

STORET RETRIEVAL DATE 76/08/25
NATL EUTROPHICATION SURVEY
EPA- LAS VEGAS

1610G1
43 07 40.0 110 01 50.0 4
SALT RIVER
16 7.5 ALPINE
T/PALISADES RESERVOIR 110691
SEC RD BRDG 3.4 MI S OF ALPINE
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/10/20	13 10		0.790	0.100K	0.020	0.015	0.015
74/11/03	15 00		0.704	0.200	0.035	0.010	0.015
74/12/15	14 30		0.890	0.500	0.040	0.050	0.060
75/01/12	11 05		1.010	0.300	0.020	0.015	0.030
75/02/09	12 20		0.930	0.400	0.032	0.008	0.050
75/03/09	09 20		0.720	0.450	0.030	0.015	0.080
75/04/13	09 36		0.660	1.250	0.025	0.010	0.080
75/05/04	08 25		0.670	3.150	0.090	0.040	
75/06/01	13 45		0.345	0.600	0.025	0.055	0.360
75/06/12	11 30		0.470	0.870	0.020	0.020	0.150
75/06/14	14 10		0.345	0.600	0.015	0.030	0.200
75/08/10	13 15		0.850	0.150	0.035	0.005K	0.030
75/09/14	09 35		0.840	0.700	0.010	0.005	0.020

K VALUE KNOWN TO BE LESS THAN INDICATED

STORET RETRIEVAL DATE 76/08/25
NATL EUTROPHICATION SURVEY
EPA- LAS VEGAS

1610H1
43 08 36.0 111 58 35.0 4
GREYS RIVER
16 7.5 FERRY PEAK
T/PALISADES RESERVOIR 130691
ANK S OF SEC RD BRDG CMP
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/10/20	15 00		0.012	0.100K	0.012	0.005K	0.005K
74/11/03	14 50		0.008	0.100K	0.035	0.010	0.010
74/12/15	14 55		0.080	0.100K	0.010	0.005	0.010K
75/06/01	13 10		0.080	0.500	0.015	0.020	0.210
75/06/12	11 45		0.095	0.250	0.010	0.015	0.280
75/06/14	13 45		0.085	0.400	0.005	0.020	0.280
75/08/10	11 40		0.025	0.100	0.155	0.005K	
75/09/14	09 45		0.010	0.800	0.010	0.005K	0.020

K VALUE KNOWN TO BE LESS
THAN INDICATED

APPENDIX E

PARAMETRIC RANKINGS OF LAKES SAMPLED BY NES IN 1975

STATE OF IDAHO

Mean or median values for six of the key parameters evaluated in establishing the trophic conditions of Idaho lakes sampled are presented to allow direct comparison of the ranking, by parameter, of each lake relative to the others. Median total phosphorus, median inorganic nitrogen and median dissolved orthophosphorus levels are expressed in mg/l. Chlorophyll a values are expressed in µg/l. To maintain consistent rank order with the preceding parameters, the mean Secchi disc depth, in inches, is subtracted from 500. Similarly, minimum dissolved oxygen values are subtracted from 15 to create table entries.

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P
1601	AMERICAN FALLS RESERVOIR	0.105	0.080	463.800	15.379	14.700	0.035
1602	CASCADE LAKE	0.032	0.060	415.067	8.081	14.800	0.009
1603	LAKE COEUR D'ALENE	0.017	0.040	380.348	10.391	12.200	0.005
1604	DWORSHAK RESERVOIR	0.010	0.080	401.866	2.420	7.400	0.009
1605	HAUSER	0.028	0.075	366.286	11.112	14.800	0.013
1606	HAYDEN LAKE	0.010	0.040	243.500	2.787	11.800	0.003
1607	ISLAND PARK RESERVOIR	0.034	0.050	391.778	9.322	12.800	0.012
1608	LAKE LOWELL	0.070	0.070	477.111	25.389	14.600	0.015
1609	MAGIC RESERVOIR	0.062	0.130	400.750	7.322	14.700	0.020
1610	PALISADES RESERVOIR	0.024	0.080	345.428	2.067	12.800	0.007
1611	LOWER PAYETTE	0.013	0.060	234.000	4.600	9.600	0.007
1612	LOWER TWIN LAKES	0.016	0.050	370.000	2.318	13.600	0.009
1613	UPPER TWIN LAKES	0.017	0.045	369.143	4.986	8.200	0.004

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P
1601	AMERICAN FALLS RESERVOIR	0 (0)	17 (1)	8 (1)	8 (1)	21 (2)	0 (0)
1602	CASCADE LAKE	33 (4)	54 (6)	17 (2)	42 (5)	4 (0)	50 (5)
1603	LAKE COEUR D'ALENE	67 (8)	96 (11)	50 (6)	25 (3)	67 (8)	83 (10)
1604	DWORSHAK RESERVOIR	96 (11)	17 (1)	25 (3)	83 (10)	100 (12)	50 (5)
1605	HAUSER	42 (5)	33 (4)	75 (9)	17 (2)	4 (0)	25 (3)
1606	HAYDEN LAKE	96 (11)	96 (11)	92 (11)	75 (9)	75 (9)	100 (12)
1607	ISLAND PARK RESERVOIR	25 (3)	71 (8)	42 (5)	33 (4)	54 (6)	33 (4)
1608	LAKE LOWELL	8 (1)	42 (5)	0 (0)	0 (0)	33 (4)	17 (2)
1609	MAGIC RESERVOIR	17 (2)	0 (0)	33 (4)	50 (6)	21 (2)	8 (1)
1610	PALISADES RESERVOIR	50 (6)	17 (1)	83 (10)	100 (12)	54 (6)	75 (9)
1611	LOWER PAYETTE	83 (10)	54 (6)	100 (12)	67 (8)	83 (10)	67 (8)
1612	LOWER TWIN LAKES	75 (9)	71 (8)	58 (7)	92 (11)	42 (5)	50 (5)
1613	UPPER TWIN LAKES	58 (7)	83 (10)	67 (8)	58 (7)	92 (11)	92 (11)